Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL QUALITY MEASURES CLEARINGHOUSE

General

Title

Heart failure (HF): hospital 30-day, all-cause, unplanned risk-standardized readmission rate (RSRR) following HF hospitalization.

Source(s)

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 condition-specific measures updates and specifications report: hospital-level 30-day risk-standardized readmission measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 112 p.

Measure Domain

Primary Measure Domain

Related Health Care Delivery Measures: Use of Services

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure estimates a hospital-level 30-day risk-standardized readmission rate (RSRR) for patients discharged from the hospital with a principal diagnosis of heart failure (HF). The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission. A specified set of planned readmissions do not count as readmissions.

The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for individuals who are 65 years and older and are Medicare Fee-for-Service (FFS) beneficiaries hospitalized in non-federal short-term acute care hospitals (including Indian Health Services hospitals) and critical access hospitals.

Rationale

Readmission of patients who were recently discharged after hospitalization with heart failure (HF)

represents an important, expensive, and often preventable adverse outcome. The risk of readmission can certainly be modified by the quality and type of care provided to these patients. Improving readmission rates is the joint responsibility of hospitals and clinicians. Measuring readmission will create incentives to invest in interventions to improve hospital care, better assess the readiness of patients for discharge and facilitate transitions to outpatient status.

Evidence for Rationale

Yale University/Yale-New Haven Hospital Center for Outcomes Research & Evaluation (YNHH-CORE). Hospital 30-day heart failure readmission measure: methodology. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2008 Apr 23. 51 p. [27 references]

Primary Health Components

Heart failure (HF); 30-day readmission rate

Denominator Description

The measure cohort consists of admissions for Medicare Fee-for-Service (FFS) beneficiaries aged 65 years and older and discharged from non-federal acute care hospitals and critical access hospitals, having a principal discharge diagnosis of heart failure (HF).

The risk-standardized readmission rate (RSRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital, multiplied by the national observed readmission rate. For each hospital, the denominator is the number of readmissions expected based on the nation's performance with that hospital's case-mix.

See the related "Denominator Inclusions/Exclusions" field.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the measure cohort.

See the *2017 Condition-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Readmission Measures* for more details.

Numerator Description

The measure assesses unplanned readmissions to an acute care hospital, from any cause, within 30 days from the date of discharge from an index heart failure (HF) admission.

The risk-standardized readmission rate (RSRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted based on the hospital's performance with its observed case-mix.

See the related "Numerator Inclusions/Exclusions" field.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the measure cohort.

See the *2017 Condition-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Readmission Measures* for more details.

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Many care processes that can influence readmission risk. In general, randomized controlled trials have shown that improvement in the following areas can directly reduce readmission rates: quality of care during the initial admission; improvement in communication with patients, their caregivers, and their clinicians; patient education; predischarge assessment; and coordination of care after discharge. Evidence that hospitals have been able to reduce readmission rates through these quality-of-care initiatives illustrates the degree to which hospital practices can affect readmission rates. Successful randomized trials have reduced 30-day readmission rates by 20% to 40% (Jack et al., 2009; Coleman et al., 2004; Courtney et al., 2009; Garasen, Windspoll, & Johnsen, 2007; Koehler et al., 2009; Mistiaen, Francke, & Poot, 2007; Naylor et al., 1994; Naylor et al., 1999; van Walraven et al., 2002; Weiss, Yakusheva, & Bobay, 2010; Krumholz et al., 2002). Since 2008, 14 Medicare Quality Improvement Organizations have been funded to focus on care transitions, applying lessons learned from clinical trials. Several have been notably successful in reducing readmissions. The strongest evidence supporting the efficacy of improved discharge processes and enhanced care at transitions is a randomized controlled trial by the Project RED (Re-Engineered Discharge) intervention, in which a nurse was assigned to each patient as a discharge advocate, responsible for patient education, follow-up, medication reconciliation, and preparing individualized discharge instructions sent to the patient's primary care provider (Jack et al., 2009). There was also a follow-up phone call from a pharmacist within 4 days of discharge. This intervention demonstrated a 30% reduction in 30-day readmissions (Jack et al., 2009). Hospital processes that reflect the quality of inpatient and outpatient care such as discharge planning, medication reconciliation, and coordination of outpatient care have been shown to reduce readmission rates (Nelson, Maruish, & Axler, 2000). Although readmission rates are also influenced by hospital system characteristics, such as the bed capacity of the local health care system, these hospital characteristics should not influence quality of care (Fisher et al., 1994). Therefore, this measure does not risk adjust for such hospital characteristics.

The Medicare Payment Advisory Commission (MedPAC) (2007) has called for hospital-specific public reporting of readmission rates, identifying heart failure (HF) as a priority condition. MedPAC finds that readmissions are common, costly, and often preventable. Based on 2005 Medicare data, MedPAC estimates that about 12.5% of Medicare HF admissions were followed by a readmission within 15 days, accounting for more than 90,000 admissions at a cost of $590 million. Between July 2005 and June 2008, the median 30-day readmission rate for HF was 24.4%, with a range of 15.9% to 34.4% (Krumholz et al., 2009).

HF incidence approaches 10 per 1000 of the population after 65 years of age (National Heart, Lung, and Blood Institute, 2007); prevalence of HF in the U.S. is estimated at nearly 6 million (Mozaffarian et al., 2015; Lloyd-Jones et al., 2010). HF is the most common principal discharge diagnosis among older adults and the third highest for hospital reimbursements in 2005 (Jessup & Brozena, 2003; Centers for Medicare & Medicaid Services [CMS], 2006), and the leading cause of readmission among Medicare beneficiaries, with nearly half of HF patients expected to return to the hospital within 6 months of discharge (Jencks, Williams, & Coleman, 2009; Krumholz et al., 1997). All-cause 30-day readmission rates per 1,000 patients discharged with HF increased by 11% between 1992 and 2001 (Merrill, 2003). HF readmission is a costly event and represents an undesirable outcome of care from the patient's perspective, and highly disparate HF readmission rates among hospitals suggest there is room for improvement (MedPAC, 2007; Bernheim et al., 2010). Moreover, there is substantial inter-hospital variation in the risk of readmission that is not clearly explained by differences in case mix.

The HF risk-standardized readmission rate (RSRR) measure is thus intended to inform quality-of-care improvement efforts, as individual process-based performance measures cannot encompass all the complex and critical aspects of care within a hospital that contribute to patient outcomes. Many

stakeholders, including patient organizations, are interested in outcomes measures that allow patients and providers to assess relative outcomes performance for hospitals.

Evidence for Additional Information Supporting Need for the Measure

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Extent of Measure Testing

Assessment of Updated Models

The heart failure (HF) readmission measure estimates hospital-specific 30-day all-cause risk-standardized readmission rates (RSRRs) using a hierarchical logistic regression model. Refer to Section 2 in the original measure documentation for a summary of the measure methodology and model risk-adjustment variables. Refer to prior methodology and technical reports for further details.

The Centers for Medicare & Medicaid Services (CMS) evaluated and validated the performance of the models using July 2013 to June 2016 data for the 2017 reporting period. They also evaluated the stability of the risk-adjustment model over the three-year measurement period by examining the model variable frequencies, model coefficients, and the performance of the risk-adjustment model in each year.

CMS assessed logistic regression model performance in terms of discriminant ability for each year of data and for the three-year combined period. They computed two summary statistics to assess model performance: the predictive ability and the area under the receiver operating characteristic (ROC) curve (c-statistic). CMS also computed between-hospital variance for each year of data and for the three-year combined period. If there were no systematic differences between hospitals, the between-hospital variance would be zero.

The results of these analyses are presented in Section 4.4 of the original measure documentation.

HF Readmission 2017 Model Result

Frequency of HF Model Variables

CMS examined the change in the frequencies of clinical and demographic variables. Frequencies of model variables were stable over the measurement period. The largest changes in the frequencies (those greater than 2% absolute change) include:

Increases in Asthma (10.1% to 13.3%), Cardio-respiratory failure and shock (29.9% to 33.7%), Other psychiatric disorders (21.1% to 23.6%), and Renal failure (62.8% to 65.0%)
A decrease in Other urinary tract disorders (30.9% to 28.5%)

HF Model Parameters and Performance

Table 4.4.2 in the original measure documentation shows hierarchical logistic regression model variable coefficients by individual year and for the combined three-year dataset. Table 4.4.3 in the original measure documentation shows the risk-adjusted odds ratios (ORs) and 95% confidence intervals for the HF readmission model by individual year and for the combined three-year dataset. Overall, the variable effect sizes were relatively constant across years. In addition, model performance was stable over the three-year time period; the c-statistic remained constant at 0.61.

Refer to the original measure documentation for additional information.

Evidence for Extent of Measure Testing

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 condition-specific measures updates and specifications report: hospital-level 30-day risk-standardized readmission measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 112 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Hospital Inpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Does not apply to this measure

Target Population Age

Age greater than or equal to 65 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Priority

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Not within an IOM Care Need

IOM Domain

Not within an IOM Domain

Data Collection for the Measure

Case Finding Period

Discharges July 1, 2013 through June 30, 2016

Denominator Sampling Frame

Patients associated with provider

Denominator (Index) Event or Characteristic

Clinical Condition

Institutionalization

Patient/Individual (Consumer) Characteristic

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions
An *index admission* is the hospitalization to which the readmission outcome is attributed and includes admissions for patients:

- Having a principal discharge diagnosis of heart failure*
- Enrolled in Medicare Fee-for-Service (FFS) Part A and Part B for the 12 months prior to the date of admission, and enrolled in Part A during the index admission
- Aged 65 or over
- Discharged alive from a non-federal short-term acute care hospital
- Not transferred to another acute care facility

*International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes used to define the HF cohort for discharges on or after October 1, 2015:

I11.0 Hypertensive heart disease with heart failure
I13.0 Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
I13.2 Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease
I50.1 Left ventricular failure
I50.20 Unspecified systolic (congestive) heart failure
I50.21 Acute systolic (congestive) heart failure
I50.22 Chronic systolic (congestive) heart failure
I50.23 Acute on chronic systolic (congestive) heart failure
I50.30 Unspecified diastolic (congestive) heart failure
I50.31 Acute diastolic (congestive) heart failure
I50.32 Chronic diastolic (congestive) heart failure
I50.33 Acute on chronic diastolic (congestive) heart failure
I50.40 Unspecified combined systolic (congestive) and diastolic (congestive) heart failure
I50.41 Acute combined systolic (congestive) and diastolic (congestive) heart failure
I50.42 Chronic combined systolic (congestive) and diastolic (congestive) heart failure
I50.43 Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure
I50.9 Heart failure, unspecified

Note: International Classification of Diseases, Ninth Revision (ICD-9) code lists for discharges prior to October 1, 2015 can be found in the *2016 Condition-specific Measures Updates and Specifications Report: Hospital-Level 30-Day Risk-Standardized Readmission Measures*.

Exclusions

- Without at least 30 days of post-discharge enrollment in Medicare FFS
- Discharged against medical advice
- HF admissions within 30 days of discharge from a prior HF index admission
- With a procedure code for left ventricular assist device (LVAD) implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions

The measure assesses unplanned readmissions, from any cause, with 30 days from the date of discharge from an index heart failure (HF) admission.

If a patient has more than one unplanned admission within 30 days of discharge from the index admission, only the first is considered a readmission. The measures assess a dichotomous yes or no outcome of whether each admitted patient has any unplanned readmission within 30 days. If the first readmission after discharge is planned, any subsequent unplanned readmission is not considered in the outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.

The risk-standardized readmission rate (RSRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted based on the hospital's performance with its observed case-mix.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the outcome.

See the *2017 Condition-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Readmission Measures* for more details.

Exclusions

Admissions identified as planned by the planned readmissions algorithm are not counted as readmissions. The planned readmission algorithm is a set of criteria for classifying readmissions and planned among the general Medicare population using Medicare administrative claims data. The algorithm identified admissions that are typically planned and may occur within 30 days of discharge from the hospital.

The planned readmission algorithm has three fundamental principles:

- A few specific, limited types of care are always considered planned (transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation);
- Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and
- Admissions for acute illness or for complications of care are never planned

The planned readmission algorithm uses a flow chart and four tables of specific procedure categories and discharge diagnosis categories to classify readmissions as planned. The flow chart and tables are available in the *2017 Condition-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Readmission Measures*.

Numerator Search Strategy

Institutionalization

Data Source

Administrative clinical data

Type of Health State

Proxy for Outcome

Instruments Used and/or Associated with the Measure

Planned Readmission Algorithm Version 4.0 (ICD-10) Flowchart

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Rate/Proportion

Interpretation of Score

Desired value is a lower score

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

Risk-Adjustment Variables

In order to account for differences in case mix among hospitals, the measure adjusts for variables (for example, age, comorbid diseases, and indicators of patient frailty) that are clinically relevant and have relationships with the outcome. For each patient, risk-adjustment variables are obtained from inpatient, outpatient, and physician Medicare administrative claims data extending 12 months prior to, and including, the index admission.

The measure adjusts for case mix differences among hospitals based on the clinical status of the patient at the time of the index admission. Accordingly, only comorbidities that convey information about the patient at that time or in the 12 months prior, and not complications that arise during the course of the hospitalization, are included in the risk adjustment.

The measure does not adjust for socioeconomic status (SES) because the association between SES and

health outcomes can be due, in part, to differences in the quality of health care that groups of patients with varying SES receive. The intent is for the measures to adjust for patient demographic and clinical characteristics while illuminating important quality differences. As part of the National Quality Forum (NQF) endorsement process for this measure, the Centers for Medicare & Medicaid Services (CMS) completed analyses for the two-year Sociodemographic Trial Period. Although univariate analyses found that the patient-level observed (unadjusted) readmission rates are higher for dual-eligible patients (for patients living in lower Agency for Healthcare Research and Quality [AHRQ] SES Index census block groups) and African-American patients compared with all other patients, analyses in the context of a multivariable model demonstrated that the effect size of these variables was small, and that the c-statistics for the models are similar with and without the addition of these variables.

Refer to Appendix D of the original measure documentation for the list of comorbidity risk-adjustment variables and the list of complications that are excluded from risk adjustment if they occur only during the index admission.

Standard of Comparison

not defined yet

Identifying Information

Original Title

Hospital-level 30-day RSRR following HF.

Measure Collection Name

National Hospital Inpatient Quality Measures

Measure Set Name

Readmission Measures

Submitter

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Developer

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Yale-New Haven Health Services Corporation/Center for Outcomes Research and Evaluation under contract to Centers for Medicare & Medicaid Services - Academic Affiliated Research Institute

Funding Source(s)

Centers for Medicare & Medicaid Services (CMS)

Composition of the Group that Developed the Measure

This measure was developed by a team of experts:

Harlan M. Krumholz, MD, SM, Yale School of Medicine
Sharon-Lise T. Normand, PhD, Harvard Medical School, Department of Health Care Policy
Patricia S. Keenan, PhD, MHS, Centers for Medicare & Medicaid Services (CMS)
Zhenqiu Lin, PhD, Yale New Haven Health Services Corporation/Center for Outcomes Research & Evaluation (YNHHSC/CORE)
Elizabeth E. Drye, MD, SM, Yale School of Medicine
Kanchana R. Bhat, MPH, YNHHSC/CORE
Geoffrey C. Schreiner, BS, YNHHSC/CORE
Yongfei Wang, MSc, Yale School of Medicine
Joseph Ross, MD, MHS, Mount Sinai School of Medicine
Jeremiah Schuur, MD, Brigham & Women's Hospital
Brett Stauffer, MD, Baylor Health Care System
Susannah Bernheim, MD, MHS, YNHHSC/CORE
Andrew Epstein, PhD, MPP, Yale University
Jeph Herrin, PhD, Yale School of Medicine
Jessica Federer, BS, Bayer HealthCare
Jennifer A. Mattera, MPH, Yale University/Yale-New Haven Hospital
Yun Wang, PhD, YNHHSC/CORE
Gregory Mulvey, BA, University of Connecticut School of Medicine
Frederick Masoudi, MD, MSPH, FACC, Denver Health Medical Center
Martha Radford, MD, NYU Medical Center
John Rumsfeld, MD, PhD, FACC, Denver VA Medical Center
John Spertus, MD, MPH, FACC, Mid America Heart Institute and University of Missouri
Frank Harrell, PhD, Vanderbilt University Medical Center

Financial Disclosures/Other Potential Conflicts of Interest

None

Endorser

National Quality Forum - None

NQF Number

not defined yet

Date of Endorsement

2016 Dec 9

Core Quality Measures

Cardiology

Measure Initiative(s)

Hospital Compare

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2017 Mar

Measure Maintenance

Annual

Date of Next Anticipated Revision

2018 Apr

Measure Status

This is the current release of the measure.

This measure updates a previous version: Specifications manual for national hospital inpatient quality measures, version 5.0b. Centers for Medicare & Medicaid Services (CMS), The Joint Commission; Effective 2015 Oct 1. various p.

Measure Availability

Source available from the QualityNet Web site .

Check the QualityNet Web site regularly for the most recent version of the specifications manual and for the applicable dates of discharge.

Companion Documents

The following are available:

Hospital compare: a quality tool provided by Medicare. [internet]. Washington (DC): U.S. Department of Health and Human Services; [accessed 2017 Oct 30]. Available from the Medicare Web site .

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 Medicare hospital quality chartbook. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017. Available from the Centers for Medicare & Medicaid Services (CMS) Web site .

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 condition-specific readmission measures updates and specifications report: supplemental ICD-10 code lists for use with claims for discharges on or after October 1, 2015. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017. Available from the QualityNet Web site .

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Source(s)

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